INSTRUCTION MANUAL

PERFORMANCE TEST EQUIPMENT

TYPE QE1740

ULTRA ELECTRONICS LIMITED
Western Avenue, London, W.3.

INSTRUCTION MANUAL

Performance Test Equipment

Type QE1740

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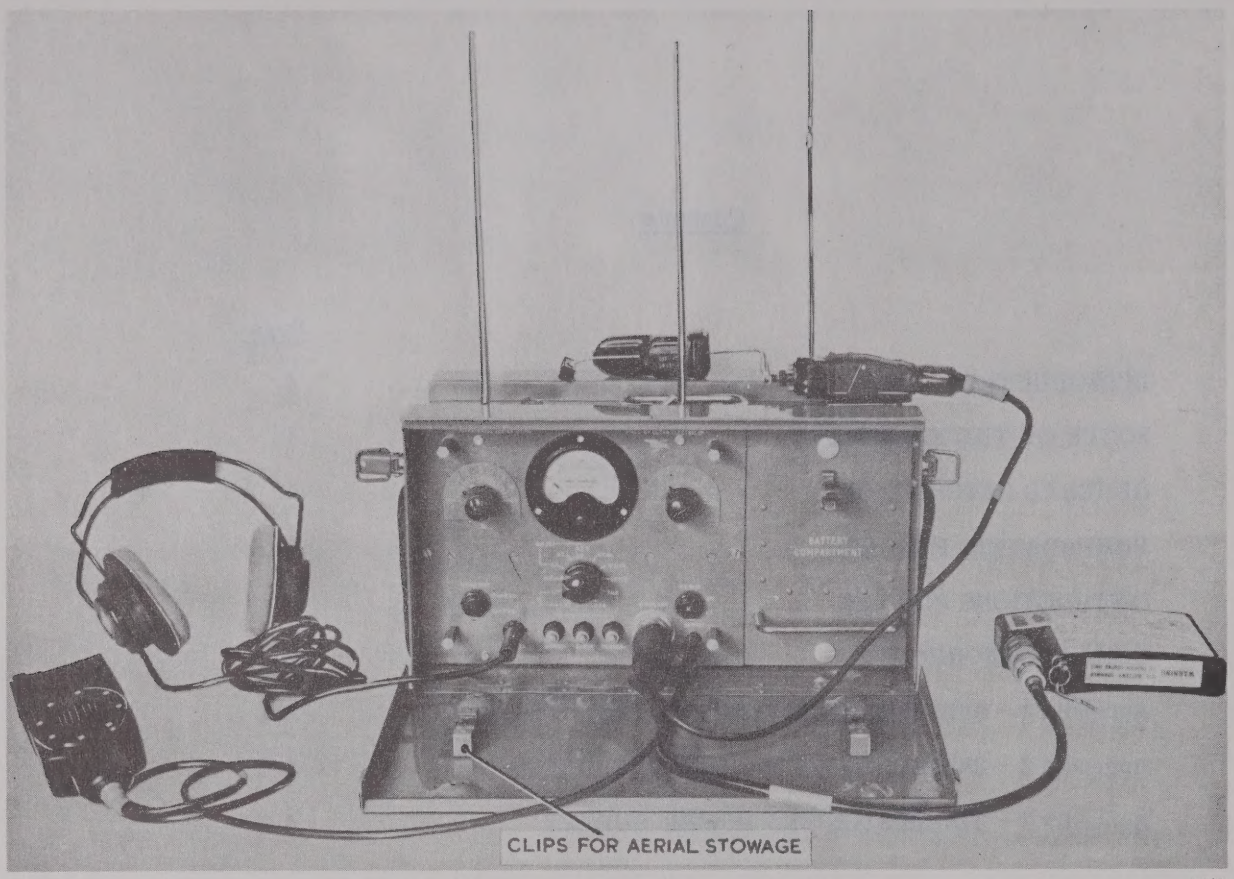


FIG. 1. PERFORMANCE TESTER
WITH BEACON UNITS IN POSITION FOR TEST.

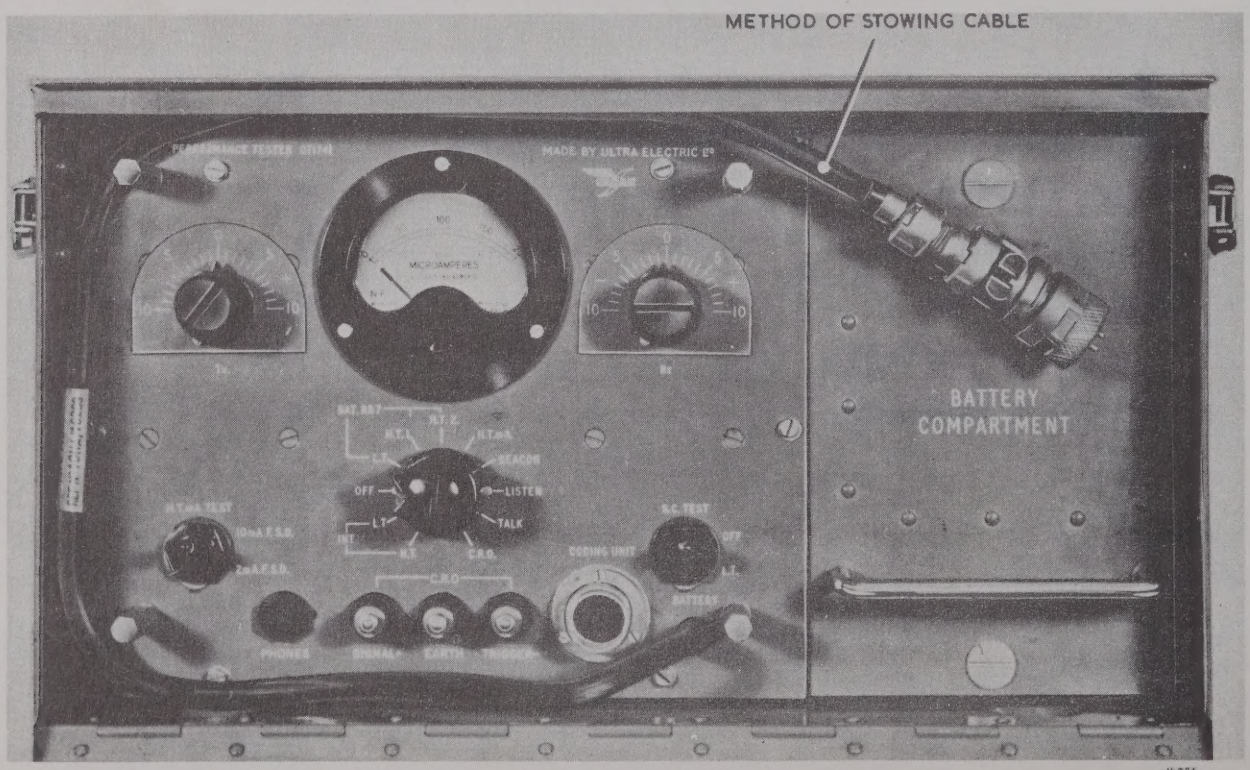


FIG. 2. TESTER FRONT PANEL.

INTRODUCTION

This Instruction Manual, Ref. M119, is part of Performance Test Equipment Type QE1740, which also includes Performance Tester Type QT174, Headset Type 32 and Instrument Case Type QK1741.

The Performance Tester (Fig. 1) is a self-contained portable instrument for use in the periodic routine maintenance of SARAH Beacon Assemblies Type RB5S, RB5K and RB51K, as specified in the SARAH Instruction & Maintenance Manual Ref. M112, Vol. 1. Full instructions for carrying out the tests specified in the SARAH manual are given in the following pages.

SCOPE OF THE EQUIPMENT

The Performance Tester facilitates:-

1. Measurement of SARAH Battery voltages, on load.
2. Measurement of HT current consumption of the Beacon Assembly in the BEACON, LISTEN and TALK modes.
3. Frequency check of Beacon Transmitter.
4. Indication of Beacon Transmitter output power.
5. Functional test of Beacon Assembly in all modes.
6. Provision of suitable output and synchronising signals for the external display of Beacon output waveforms.
7. Measurement of Performance Tester's own internal batteries.
8. Means of adjustment of the Tester frequency calibration against a frequency sub-standard to ensure the required degree of accuracy in Beacon testing.

GENERAL DESCRIPTION

The Performance Tester and its batteries are contained in a duralumin case fitted with a shoulder strap and carrying handle. A hinged front cover protects the controls and meter when the Tester is not in use. Two detachable rod aerials are stowed in the space between the cover and front panel.

During tests, the Beacon Assembly is disposed thus:-

1. The SARAH Battery is connected to a flying lead, fitted with a special plug, which is brought out from the Tester panel.
2. The Coding Unit is plugged into a socket on the Tester panel.
3. The Beacon Transmitter is mounted in a clip on the top of the Tester case, so that its position is fixed relative to the Tester aerials.

CAUTION:- Do not allow the Beacon aerial to make metallic contact with the SARAH Battery or the case of the Test Set after the Beacon Transmitter Unit has been switched off, since it will discharge the l.t. section of the battery regardless of the setting of the h.t. switch fitted to the battery.

Internal Batteries for Tester Circuits

1. HT 90V: Ever Ready Type B131 (Ref. 5J/3374). U.S. equivalent: National Carbon Type 490.
2. LT 7.5V: Ever Ready Type AD31 (Ref. 5J/3373). U.S. equivalent: National Carbon Type 717.

Brief Circuit Details

The Performance Tester circuit (Fig. 3) is in two main sections, viz:-

1. Metering section, consisting of a multi-range meter with appropriate shunts and multipliers. The meter is scaled 0 to 200.
2. Transmitter-receiver section, consisting of:-
   (a) A single valve transmitter unit.
   (b) A receiver tuned circuit followed by a germanium diode detector and an integrator circuit.
   (c) A two-valve AF amplifier.

A complete circuit description is included later in this manual.

PREPARATION FOR USE

INTERNAL BATTERIES

Batteries Required (one of each type)

Refer to "Internal Batteries for Tester Circuits" on page 4.

Inserting the Batteries

1. Release the hinged fasteners at the top left-hand and right-hand sides of the case and lower the cover.
2. Turn the two quick-release fasteners of the battery compartment until their slots are vertical and withdraw the battery compartment.
3. Turn the knurled-head screw at the rear of the compartment counter-clockwise (as viewed from the front) until the battery clamp has moved backwards far enough to accommodate the batteries.
4. Place the batteries in the compartment with the LT battery towards the front. The LT output socket should be towards the rear and the HT+ socket to the right, as viewed from the front of the compartment.
5. Connect the battery terminals to the clips and plug of the Tester leads as appropriate.
   NOTE: An additional 2-pin plug on a flexible lead is provided for use when the normal internal LT battery is not available. This plug, when not in use, is inserted into a dummy socket in the battery compartment.
6. Tighten the battery clamp until the batteries are firmly held by the rubber grommets.

7. Ensure that the slots of the quick-release fasteners are horizontal, push the battery compartment back into the case and snap the fasteners home..

Testing the Internal Batteries

1. Turn the selector switch on the Tester front panel to the fully counter-clockwise position (labelled INT. HT). If the meter reading is less than 70, reject the HT battery.
2. Turn the selector switch to the next position (INT. LT). If the meter reading is less than 110, reject the LT battery.

Aerials

Unscrew the sealing caps from the aerial sockets on top of the case, remove the aerial rods from their stowage position and insert them into their respective sockets.

Calibrating the Performance Tester Receiver

The frequency calibration of the RECEIVER control must be checked before use, unless this has previously been done during the last twenty-four hours, or six hours in climates subject to rapid changes in temperature.

The calibration must be checked against a wavemeter-type signal generator, such as Wavemeter Type 1433 (Ref. 10T/547), of accuracy not worse than 3 parts in 10,000, as detailed in the following instructions:-

1. Loosely couple the output of the signal generator to the right-hand (receiving) aerial of the Performance Tester.
   NOTE: This can be done by feeding the output of the signal generator into a vertical wire about 12 inches long, placed close to the Tester aerial.
2. Adjust the signal generator to obtain a modulated output at 244 Mc/s.
3. Insert the jack plug of the Headset provided into the jack on the Tester front panel. Turn the selector switch to the TALK position.
4. Adjust the RECEIVER control to the setting entered on the instruction label inside the Tester cover. The modulation tone should now be audible in the Headset.
5. Slowly vary the setting of the RECEIVER control about its correct position and ascertain whether peak loudness of the tone occurs at the correct setting.
6. If necessary, adjust the preset capacitor beneath the RECEIVER control until peak loudness is obtained at the correct position.
7. Turn the selector switch to the OFF position.

INSTRUCTIONS FOR USE

The following instructions detail the procedure for carrying out a complete series of tests on the Beacon Assembly as specified in Part 3 of the SARAH Instruction & Maintenance Manual, Vol. 1.

CONNECTIONS AND SETTING UP

1. Insert the battery plug on the Tester flying lead into the socket of the SARAH Battery under test and lock in position with the ring-nut.
2. Connect the Coding Unit of the Beacon Assembly under test to the socket labelled CODING UNIT on the Tester panel and lock in position with the ring-nut.
3. Place the Beacon Transmitter in the clip at the top right-hand end of the Tester case, with the leads to the right.
4. If a cathode-ray oscilloscope is to be used, place this to the left of the Tester at a distance of at least two feet from the Tester. Ensure that no other metal object is situated within three feet of the SARAH Beacon aerial.

A. SARAH BATTERY TYPE RB7 OR RB7E

1. Ensure that the Beacon Transmitter is switched off, i. e., that the switch plunger is pushed fully in.
   WARNING: The Beacon aerial uncoils with considerable force when the cover is removed, and care should be taken to avoid possible injury to persons standing nearby
2. Retest the internal batteries of the Performance Tester as detailed on page 5.
3. Return the selector switch to the OFF position.
4. Depress the switch labelled S. C. TEST to the ON position for 30 seconds. At 30 seconds, observe the reading on the meter, and compare this reading with the appropriate figure quoted on the instruction label inside the Tester cover.
5. The Ever Ready (or Berec) Battery (Type RB7E) figure quoted is valid over a temperature range of +5°C to +38°C inclusive. If the reading obtained is less than this figure, reject the Battery.
6. The Vidor Battery (Type RB7) figure quoted must be corrected for temperature in accordance with the table below. If the reading obtained is less than the corrected figure, reject the Battery.

* Before testing, the SARAH Battery must be acclimatised for at least three hours to the temperature at which readings are to be taken.

Ambient Temperature °C	Ambient Temperature °F	Correction to be applied to Meter Reading
4 to 6	39 to 43	-18
6 to 8	43 to 46	-16
8 to 10	46 to 50	-14
10 to 12	50 to 54	-12
12 to 14	54 to 57	-10
14 to 16	57 to 61	- 8
16 to 18	61 to 64	- 6
18 to 20	64 to 68	- 4
20 to 22	68 to 72	- 2
22 to 24	72 to 75	0(as calibrated)
24 to 26	75 to 79	+ 2
26 to 28	79 to 82	+ 4
28 to 30	82 to 86	+ 6
30 to 32	86 to 90	+ 8
32 to 34	90 to 93	+10
34 to 36	93 to 97	+12
36 to 38	97 to100	+14

The figure given in col. 3 is the number which must be subtracted from or added to the calibration figure quoted on the Test Set label.

Example: A Battery is tested at 65°F on a Tester whose calibrated reading, quoted on the instruction label, is 100. The reading obtained is 97, i. e., 3 less than 100. Since the correction in this case is -4, leaving 96 as the permissible pass figure, the Battery LT section is satisfactory.

7. Pull out the switch plunger of the Beacon Transmitter to its full extent, thereby switching the Beacon on.
8. Remove the release pin from the Battery isolating switch.
9. Carry out test procedure as detailed in Appendix 1, page A1.
10. The shelf-life of a Battery is the length of time that a Battery which is not being used can be expected to remain in good condition before being put into service; figures are given below. Do not apply tests detailed above to a Battery whose shelf-life has expired: such a Battery must be rejected for operational use whatever the apparent condition.

Shelf-life: (For temperate storage conditions)
Battery Type RB7 (Vidor) : 12 months
Battery Type RB7E (Ever Ready) : 6 months

NOTE: These figures are subject to revision.

B. SARAH HT. 2. CURRENT CONSUMPTION

NOTE: Before proceeding with the following tests, disconnect the beacon 'operational' Battery Type RB7, or Type RB41B if a Transistor Power Unit is being used, and replace it with a time expired battery which has also passed the previously detailed tests. This will obviate any unnecessary drain on the 'operational' battery.

1. Turn the selector switch to the HT mA position. If the meter reading exceeds 40, reject the Beacon Assembly.
   CAUTION: Do not operate the HT mA TEST switch if the meter reading exceeds 40, or the meter will be damaged.
2. If the reading is less than 40, depress the HT mA TEST switch to the SENS position. Reject the Beacon Assembly if the meter reading exceeds 170.
3. Depress the LISTEN button of the Speech Unit under test. If the meter reading exceeds 90, reject the Beacon Assembly.
4. Depress the TALK button of the Speech Unit. If the meter reading exceeds 130, reject the Beacon Assembly.

C. FUNCTIONAL TESTS

1. Insert the jack plug of the Headset provided into the jack on the front panel of the Performance Tester.
2. Turn the selector switch to the BEACON position and rotate the RECEIVER control to obtain maximum deflection on the meter. Verify that the RECEIVER control pointer lies between the +2 and -2 marks on the graduated scale. A low-pitched tone will now be audible in the Headset.
3. Turn the selector switch to the LISTEN position and allow approximately one minute for the Tester transmitter to warm up.
4. A tone will now be heard in the Headset. Verify that the pitch of this tone varies when the TRANSMITTER control is rotated.
5. Press the LISTEN button on the SARAH Speech Unit and verify that:-
   (a) A tone is audible in the combined microphone/telephone of the Speech Unit.
   (b) The pitch of the tone varies as the TRANSMITTER control is rotated.
   NOTE: Temporarily disconnect the Headset jack plug during this test.

6. Turn the selector switch to the TALK position. Wait until the tone in the Headset dies away, then press the TALK button on the Speech Unit.
7. Whistle into the Speech Unit microphone/telephone. The meter will show a varying deflection and the whistle will be audible in the Headset.
   NOTE: Readjust the RECEIVER control, if necessary.

D. EXAMINATION OF OUTPUT WAVEFORMS

A cathode-ray oscilloscope having a calibrated timebase which can be externally triggered is required for these tests.

1. Connect the SIGNAL + terminal on the Tester front panel to the Y-amplifier terminal of the oscilloscope.
2. Connect the TRIGGER - terminal of the Tester to the TRIGGER or SYNC terminal of the oscilloscope, and the EARTH terminal of the Tester to EARTH on the oscilloscope.
   NOTE: Use the same leads for testing all Beacon Assemblies, to facilitate comparison of amplitudes and to prevent misleading indications. It is advisable not to use twisted or screened leads for these connections.
3. Turn the selector switch to the CRO position.
4. Verify that the following output characteristics, in the BEACON mode, of the Beacon Assembly under test are within the limits given:-
   (a) Group repetition frequency: 160 to 260 g. p. s.

   NOTE: If the g. r. f. measured in para 4 (a) is found to be greater than 260 g. p. s., it should not be assumed that the beacon is faulty before ensuring that the test battery voltage is sufficient.
   To measure the test battery voltage, set the selector switch on the front panel of the Performance Tester Type QE1740 to the BAT. RB7. L. T. position and note the meter reading which should be not less than 130. If the meter reading is less than 130 the test battery should be replaced by another which gives the necessary reading. *
   * It is not necessary to discard a test battery which will not give the required reading of 130 unless other tests show it to be faulty.

   (b) Pulse width: Codes, A, B and C 4 to 10 μs. Code D 5 to 13 μs.
   (c) Pulse spacing (coding):
   Code A (Red sleeve) : 95 to 129 μs.
   Code B (Blue sleeve) : 130 to 169 μs.
   Code C (Yellow sleeve) : 170 to 224 μs.
   Code D (Green sleeve) : 225 to 300 μs.
   (d) Pulse amplitude: Verify that the amplitude of the pulses produced by the Beacon Assembly under test, as seen on the cathode-ray tube, does not differ unduly from that of other Beacons.

E. CONCLUSION OF TESTS

(1) Switch off the Performance Tester (see caution below).
(2) Refit the beacon 'operational' battery, (if previously replaced as mentioned in the Note immediately below B. SARAH HT. 2 CURRENT CONSUMPTION) i. e., Battery Type RB7, or Battery Type RB41B if a Transistor Power Unit is being used, and ensure that the characteristic 'buzz' is emitted from the Speech Unit to verify satisfactory battery reconnection.

CAUTION: Always turn the selector switch to the OFF position when the Performance Tester is not in use. Otherwise, the internal batteries will discharge and the meter may be damaged during transit because the protective short-circuit is applied in the OFF position only.

CIRCUIT DESCRIPTION

A theoretical circuit diagram of the complete Performance Tester is given in Fig. 3. There are two main groups of circuits, viz., the metering circuits for battery testing and the transmitter, receiver and amplifier circuits for functional testing of the SARAH Beacon Assembly.

These circuits are selected as required by a nine-pole 12-way wafer switch SW2, mounted immediately below the meter on the front panel. The switch wafers are suffixed by letters "a" to "j" inclusive on the diagram. The complete series of tests is obtained by rotating SW2 progressively clockwise.

1. METERING CIRCUITS

The meter is a moving-coil instrument requiring 200 micro-amperes for full-scale deflection.

Shunts and multiplier resistors for measurement of battery voltage and load current are switched into circuit by operation of wafers a, b and c of the selector switch, in the following sequence:-

(a) INT. HT

The multiplier for the INT. HT position of SW2 (fully counter-clockwise) is R12. Since the HT voltage, and also the LT voltage indicated in the next position of SW2, is required to be measured on load, the heaters of valves V1, V2 and V3 are switched on in these first two positions by wafers SW2d and SW2e respectively.

(b) INT. LT

The multiplier for the INT. LT position consists of R5 and R6 in parallel.

(c) OFF

A short-circuit is applied to the meter in this position, for protection during transit. Operation of toggle switch SW3, the S. C. TEST switch, removes the short-circuit and connects R28 and R29 in series between the SARAH Battery LT terminal and earth, via contact SW3a. At the same time, the meter is connected across R29 - which serves as a shunt - via contact SW2b, to give an indication of LT current on high discharge.

(d) BATTERY RB7 LT

The meter is connected to the LT terminal of the SARAH Battery via multiplier resistors R10 and R11 in parallel.

(e) BATTERY RB7 HT. 1

The multiplier resistor for the HT. 1 (90V) position is R9.

(f) BATTERY RB7 HT. 2

The multiplier for the HT. 2 (420V to 435V) position consists of R7 and R8 in parallel.

(g) HT mA

For measurement of HT. 2 current, the meter is connected in series with R4 and R3 between the 435V positive terminal of the SARAH Battery and the Coding Unit. The meter is shunted by R2. A 2-pole changeover switch (SW1, HT mA TEST) is provided to increase the sensitivity of the meter when the current has been assessed in the low-sensitivity circuit. Operation of SW1 increases the shunt resistance by insertion of R1 and reduces the multiplier resistance by short-circuiting R3.

2. TRANSMITTER UNIT

The valve V1, which functions as a Colpitts oscillator by virtue of the interelectrode capacitances, squegs at approximately 1 kc/s and thus generates pulses suitable for reception by the SARAH Beacon Assembly in the LISTEN mode.

The LT supply to the valve is only switched on when the selector switch is in the INT. HT, INT. LT and LISTEN positions.

A variable capacitor C3 enables the radio frequency to be varied over a small range. The lower end of L1 is connected to the grid via a blocking capacitor C21. The grid network C22, C1 and R13 determines the rate of squegging (i. e., the pulse repetition frequency) and the pulse width. Choke L8 in series with the network and C20 in parallel form an RF filter. The pulsed RF output in the anode circuit is passed to the transmitter aerial by the loop L7.

An AF pulse, taken from R14 at the HT end of the RF filter L3 and C4, is applied via SW2h to the integrating network in the grid circuit of V2, the first AF amplifier.

The amplified output is fed to the Headset via transformer TR1 as an indication that the transmitter is working correctly.

An RF filter L2 C2 is inserted in the live heater lead, and the HT feed is decoupled by C5.

3. RECEIVER UNIT

The pulse signal from the SARAH Beacon Transmitter is received by the Tester aerial and transferred via L6 to the parallel tuned circuit L4, C18, C17. A preset trimmer, C19, is connected in parallel with the variable tuning capacitor C17 to enable the RECEIVER control to be calibrated against a standard frequency source. Capacitor C18 has a negative temperature coefficient, which increases the stability of the tuned circuit by compensating for the positive temperature coefficients of C17 and C19.

After demodulation by the germanium diode detector MR1, in conjunction with stray circuit capacitances, the signal is RF - filtered by L5, which precedes the diode load resistor R27.

When the selector switch SW2 is in the BEACON position, the signal is integrated by C14, which is connected in parallel by wafer SW2f and applied to the meter via SW2b. The signal is also taken, via SW2j, to the grid of the second AF amplifier valve, V3, of which the output is fed to the Headset via wafer SW2g and transformer TR1. Thus, an indication of signal amplitude is given by the meter and a tone is obtained in the Headset.

In the TALK position of the selector switch, capacitor C15 (0.001 μF) is connected in place of C14 (2.0 μF). The pulses emitted by the Beacon Transmitter in the TALK mode have a higher p. r. f. (some 6 to 12 kc/s) and are of smaller amplitude than the normal BEACON-mode pulses. Speech modulation is applied to the p. r. f. The effect of C15 is partially to smooth out the p. r. f. so that the signal applied to the integrating network in the grid circuit of the first AF amplifier, V2, is mainly the variation in p. r. f. caused by the modulation. In this position also, the amplifier output is applied to Headset via TR1. The output signal from TR1 is rectified by MR2, in series with a preset variable resistor RV1, and applied to the meter, producing a deflection which varies in accordance with the speech modulation.

4. AMPLIFIER UNIT

Two stages of audio-frequency amplification are provided. Both stages are used in the LISTEN and TALK positions of the selector switch, whereas the second stage only is used in the BEACON and CRO positions.

An integrating network, consisting of series resistors R15, R16, R17 and R18 and parallel capacitors C6, C7, C8 and C9, precedes the grid coupling capacitor C10 and resistor R19 of the first stage, V2.

The anode load and screen feed resistors R23 and R24 each have a value of 1 megohm, thus the anode and screen potentials are lower than normal and the valve functions as a "starved" amplifier. This type of circuit is used to obtain a high gain, with low current consumption, where only a small grid swing is required. The screen is decoupled by C11.

The first stage is coupled by C12 to the second stage, V3, the grid resistor of which is R25. In the BEACON position, the input to V3 grid is applied via C16. This stage is a normal AF power amplifier, the anode load being R26 and the output being parallel fed via C13 and switch wafer SW2g to the output transformer TR1. The screen is connected directly to HT positive. A telephone jack JK 1 is connected across the secondary of TR1.

Grid bias for V2 and V3 is obtained from a potential divider, consisting of R20, R21 and R22, connected between LT negative and the live heater lead, LT positive being earthed. Resistor R22 also functions as a voltage dropper for the heaters.

The LT supply to the amplifier unit is switched on in all positions except BATTERY RB7 LT. BATTERY RB7 HT. 1, BATTERY RB7 HT. 2, HT mA and OFF.

5. CRO POSITION OF SELECTOR SWITCH

The final switch position (fully clockwise) is labelled CRO.

In this position, the Beacon signal picked up by the Tester receiver aerial is demodulated and applied via SW2j to V3, where it is amplified and brought out to the TRIGGER terminal for triggering the oscilloscope timebase.

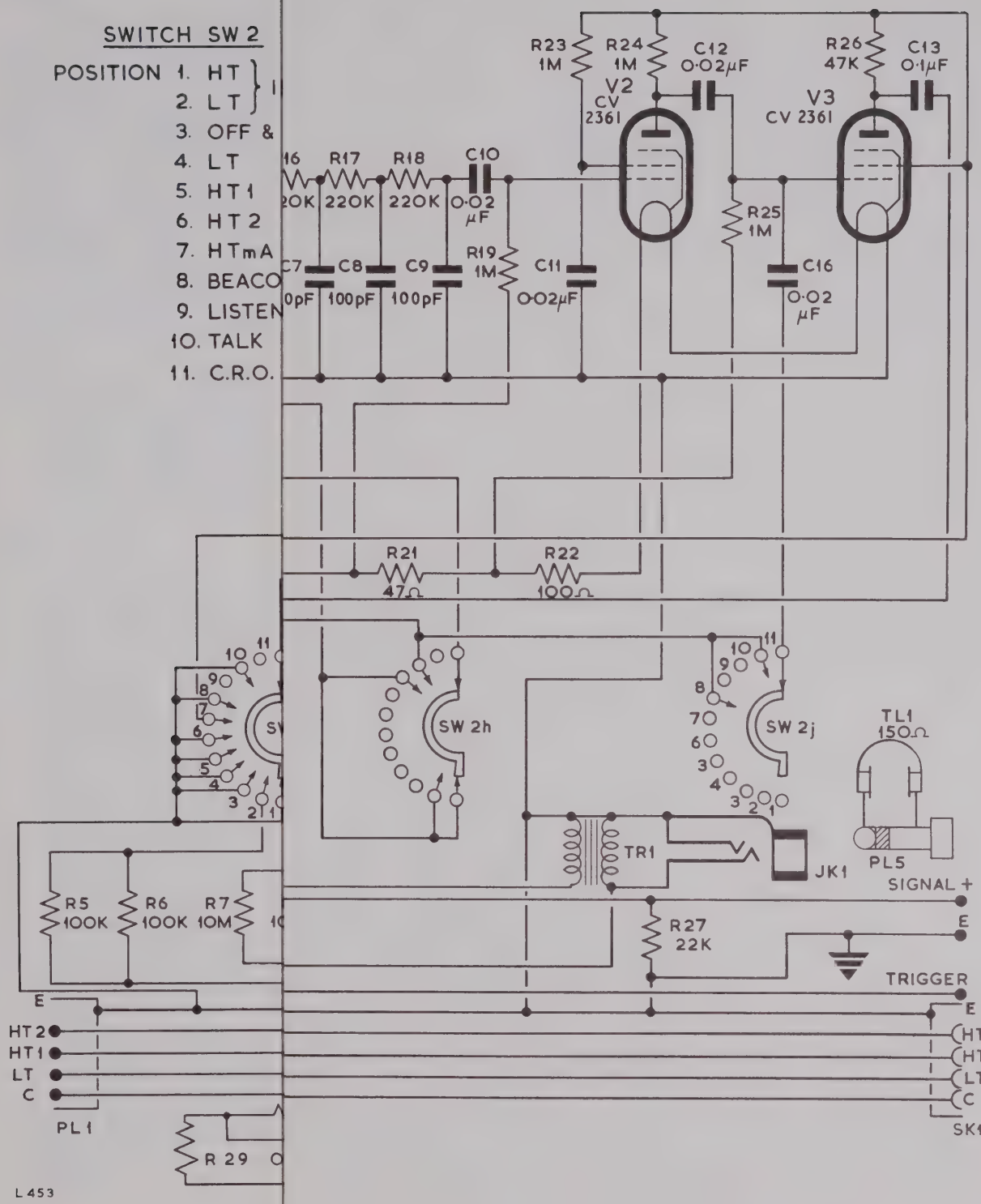
The output of the receiver is brought out direct to the SIGNAL + terminal for connection to the oscilloscope Y-amplifier.

SUMMARY OF TESTS

The following Table summarises the tests which can be applied to the Beacon Assembly, using the Performance Tester only.

Test Ref.	Selector Switch	SARAH Mode	Pass Limits	Remarks
A. 2	INT. HT	OFF	70 min.	
A. 2	INT. LT	OFF	110 min.	
A. 4	OFF	OFF		S. C. TEST (See Section A)
A. 9	BATT. RB7 HT. 1	BEACON	78 min.	
A. 10	BATT. RB7 HT. 2	BEACON	75 min.	
B. 1	HT mA	BEACON	40 max.	
B. 2	HT mA	BEACON	170 max.	HT mA switch to SENS.
B. 3	HT mA	LISTEN	90 max.	
B. 4	HT mA	TALK	130 max.	
C. 2	BEACON	BEACON	+2 and -2	RECEIVER dial used
C. 5	LISTEN	LISTEN		Pitch should vary with TRANSMITTER dial setting
C. 7	TALK	TALK		Reading should vary when Beacon is modulated

CAUTION: Turn selector switch to OFF after use.


SWITCH SW 2
POSITION 1. HT
2. LT
3. OFF &
4. LT
5. HT 1
6. HT 2
7. HTmA
8. BEACO
9. LISTEN
10. TALK
11. C.R.O.
R23 1M
R24 1M
C12 0·02μF
V2 CV 2361
R26 47K
C13 0·1μF
V3 CV 2361
R16 20K
R17 220K
R18 220K
C10 0·02 μF
R25 1M
C7 0pF
C8 100pF
C9 100pF
R19 1M
C11 0·02μF
C16 0·02 μF
R21 47Ω
R22 100Ω
SW 2h
SW 2j
TL1 150Ω
TR1
JK1
PL5
SIGNAL +
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C
PL1
SK1
R 29
L453

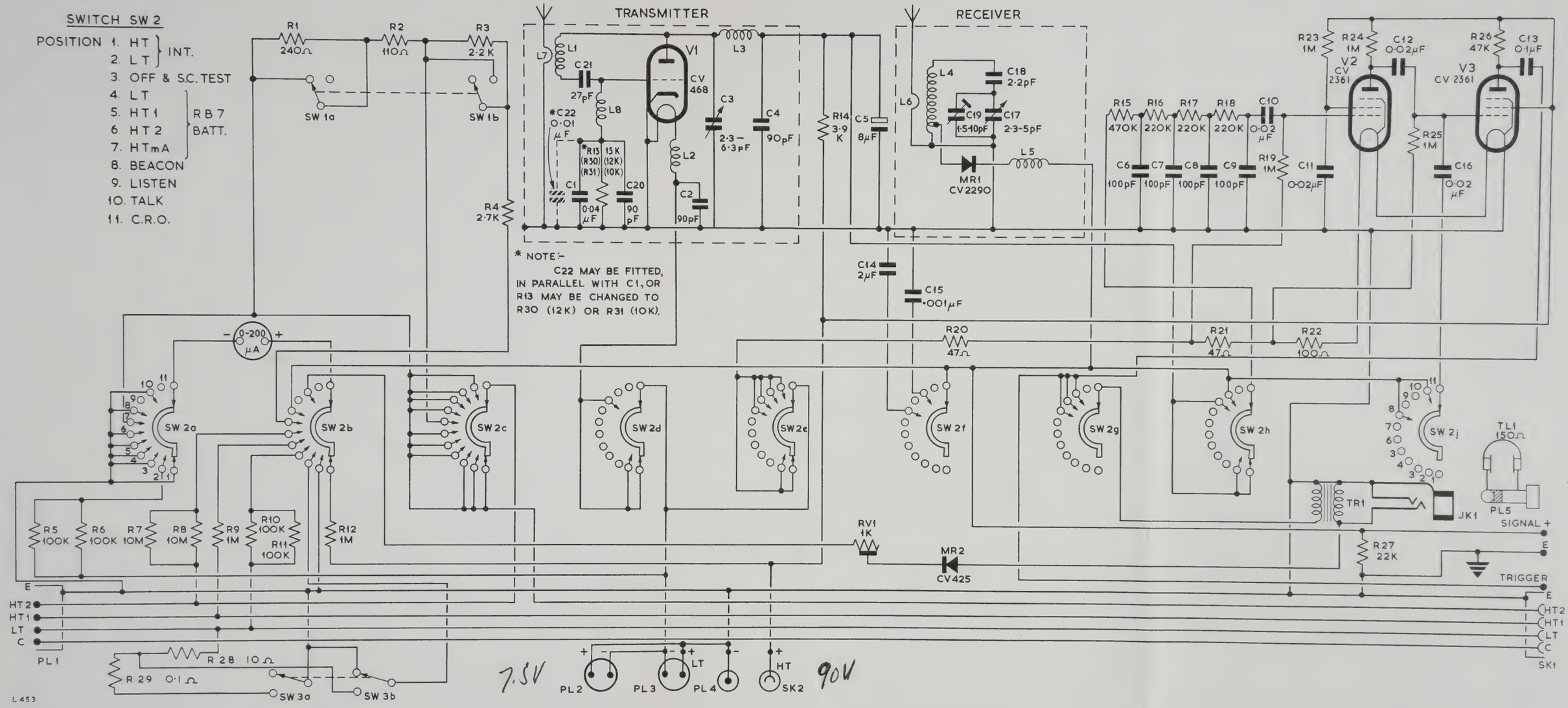


FIG. 3 CIRCUIT DIAGRAM

SARAH BATTERY SWITCH TEST WEIGHT

During stowage of the Battery in the life jacket, the HT isolating switch is held open by a pin, which is removed when the release toggle is operated to prepare the Beacon for use. The two switch contacts then close, connecting together the two sections of the HT battery.

As a test method to ensure correct operation of the switch, a weight has been introduced which is suspended from the switch ring while the Battery is connected to the Performance Tester. Thus, a continuity test can be made via the switch contacts by verifying that HT voltages are applied from the Battery to the Tester.

ADDITIONAL TEST EQUIPMENT

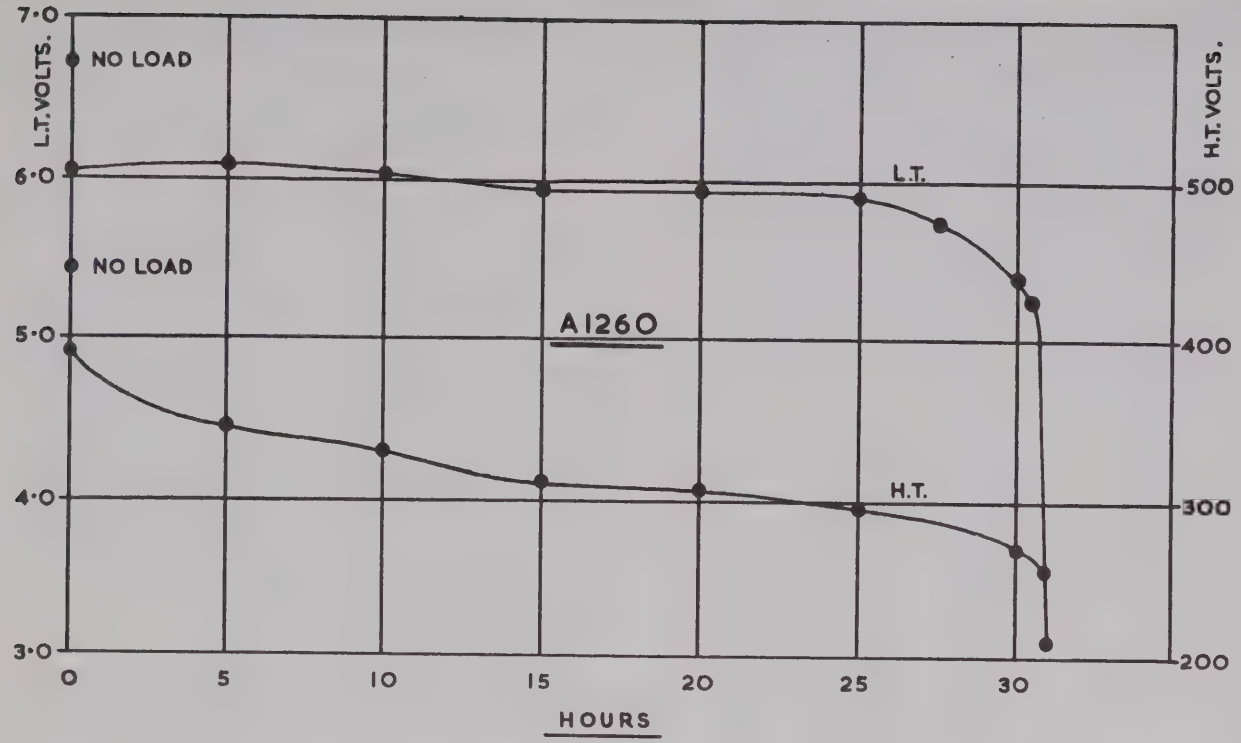
Test Weight Type QB1731.
NOTE: This weight is fitted with a suitable hook for suspension from the Battery switch ring. The total weight including the hook is 12 oz $\pm \frac{1}{4}$ oz.

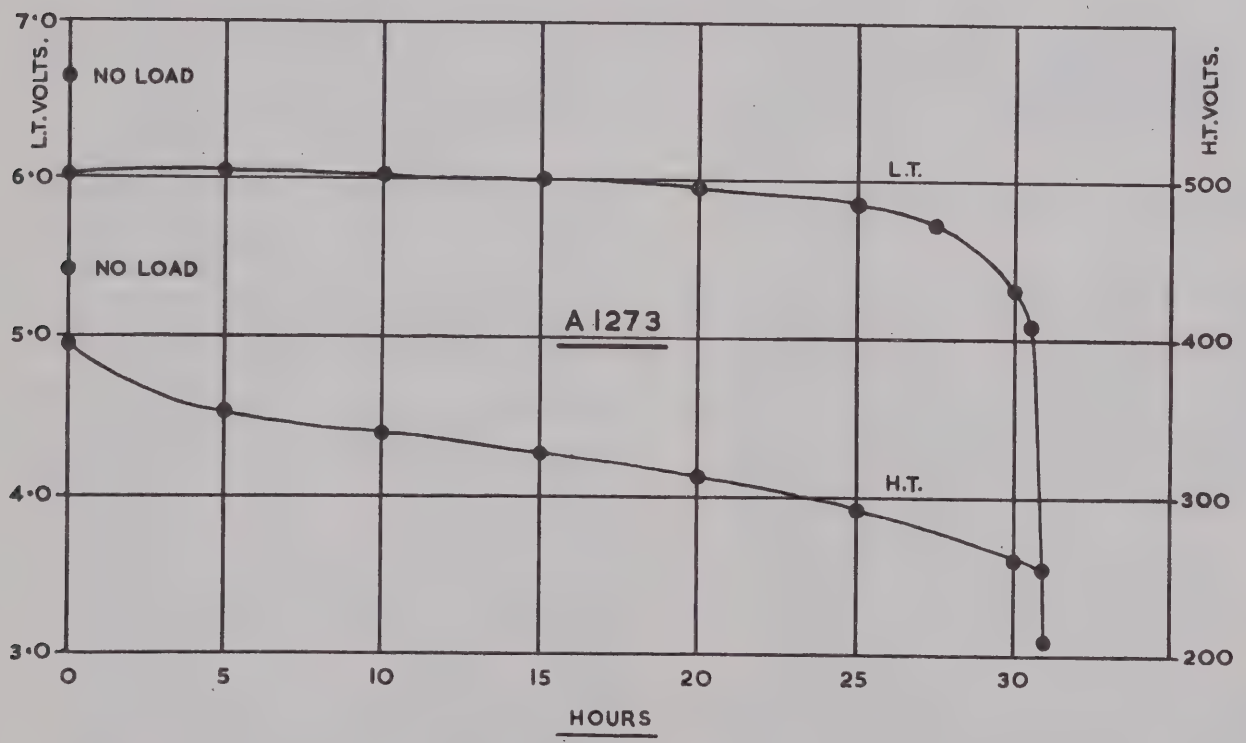
PROCEDURE

1. Place the Battery in an inverted position on the right-hand corner of the Tester and suspend Switch Test Weight Type QB 1731 from the split ring fitted to the isolation switch (Fig. A. 1).
2. Rotate the selector switch to the BATTERY RB7 H. T. 1 position. (Ignore the reading observed while passing through the BATTERY L. T. position since this is not now used.) Observe that the BATTERY RB7 H. T. 1 reading is steady and note the reading. Reject the Battery if the reading is unsteady or below 78.
3. Rotate the selector switch to the BATTERY RB7 H. T. 2 position. Observe that the reading is steady and note the reading. Reject the Battery if the reading is unsteady or below 75.
4. Depress the LISTEN button on the Speech Unit. After 30 seconds, with the LISTEN button still depressed, repeat the procedures detailed in 2 and 3, above, recording the new readings for each position of the selector switch. Reject the Battery if the H. T. 1 reading is more than 10% lower than that noted in 2, above, or, the H. T. 2 reading is more than 10% lower than that noted in 3, above.

FIG. A. 1. BATTERY SWITCH TEST.

SARAH BATTERY CHARACTERISTICS





The diagrams given above indicate the result of life tests on SARAH batteries after their six months storage.

Date of manufacture A1260 - 14 Dec., 1955
Date of manufacture A1273 - 16 Dec., 1955
Date of Test - 14-16 June, 1956
Load - Beacon No. 2741. HT current 1.3mA at 450V, 6.2V
Mean temperature, 20°C

TRANSISTORISED POWER SUPPLY

consisting of

SARAH TRANSISTOR POWER UNIT
TYPE RB61 OR TYPE RB63

with

BATTERY TYPE RB41B

This appendix gives information for testing the above equipment in conjunction with the Performance Test Equipment Type QE1740. The tests detailed below are to be used in place of those given on page 5 of this manual, under the section heading "A. SARAH BATTERY TYPE RB6 OR RB7E". Instructions in the manual preceding or following that section remain applicable but where SARAH Battery is mentioned, the addition of "or Transistorised Power Supply" is to be understood.

A. SARAH TRANSISTOR POWER UNIT TYPE RB61, OR TYPE RB63, WITH BATTERY TYPE RB41B

NOTE: Before proceeding with the following tests ensure that the Battery Type RB41B has not exceeded its shelf life, viz:-

For temperate storage conditions: 24 months

For tropical storage conditions: 12 months

The battery should also have been acclimatised for at least six hours to the testing ambient temperature.

1. Ensure that the Beacon Transmitter is switched off, i. e., that the switch plunger is fully pushed in.

   WARNING: The Beacon aerial uncoils with considerable force when the cover is removed, and care should be taken to avoid possible injury to anyone standing nearby.
2. Retest the internal batteries of the Performance Tester as detailed on page 5.
3. Return the selector switch to the OFF position.
4. Remove the release pin from the battery switch.
5. Depress the S. C. TEST switch to the ON position. During this test the switch must not be left on for longer than necessary, and for 30 seconds as a maximum. Note the reading on the meter which should rise and remain constant at, or above, the acceptance figure quoted on the test set instruction label for BEREC/EVER READY Battery Type RB7E. Should the meter reading not remain constant, however, and continue to rise slowly beyond the acceptance value, the meter must be observed for the full 30 seconds to ensure that there is no subsequent falling off below the acceptance figure.

   NOTE: For the above figures to be correct the Battery Type RB41B should be tested in an ambient temperature of 18^{o}-22^{o}C (66^{o}-71^{o}F). For ambient temperatures outside this range a correction factor is necessary and the following table should be consulted.

Ambient Temperature		Correction to Acceptance Figure on label
^{o}C	^{o}F	
0 - 1	32 - 34	- 37
1 - 3	34 - 37	- 23
3 - 5	37 - 41	- 18
5 - 7	41 - 45	- 14
7 - 9	45 - 48	- 11
9 - 12	48 - 54	- 7
12 - 15	54 - 59	- 4
15 - 18	59 - 66	- 2
18 - 22	66 - 71	0
22 - 27	71 - 80	+ 2
27 - 32	80 - 89	+ 4
32 - 37	89 - 98	+ 6
37 - 42	98 - 107	+ 8
42 - 46	107 - 115	+ 10
46 - 50	115 - 122	+ 12

* The correction figure should be algebraically added to the acceptance figure stamped on the instruction label for BEREC/EVER READY Battery Type RB7E.

Reject the battery if it does not meet the above figures

6. Release the S. C. TEST switch to its off position.
7. Switch on the Beacon Transmitter by pulling the attached cord to its full extent.
8. Place the Transistor Power Unit and Battery in an inverted position on the right-hand corner of the tester and suspend Switch Test Weight Type QB1731 from the toggle lever fitted to the Battery switch.

   NOTE: On earlier Test Weights the hook may be too thick to enter the toggle lever. This may be overcome by using a suitable hook made from heavy gauge wire with the Test Weight attached to the wire.
9. Turn the selector switch to the BATTERY RB7 LT position, allow sufficient time for the Beacon to warm up, and note the meter reading. The reading must remain steady after the initial warming up period. If the reading is intermittent reject the Battery.

10. Turn the selector switch to the BATTERY RB7 H. T. 2 position. Verify that the meter reading is steady and is not less than 0. 54 times the reading obtained in paragraph (9). The graph shown in Fig. A. 2 may be used to avoid calculation. If the meter reading is not steady or does not reach the minimum acceptance figure, locate the faulty item by substituting another Beacon or Transistor Power Unit and Battery.
11. Remove the Test Weight.

The remainder of the tests detailed below refer to the Transistor Power Unit Type RB61 (speech type), only. For Transistor Power Unit Type RB63, proceed with tests on page 6 of the manual, under "B. SARAH HT. 2. CURRENT CONSUMPTION".

12. With the Beacon still switched on, return the selector switch to the Battery RB7 LT position.
13. Press the LISTEN button on the SARAH Speech Unit and allow a few seconds for the meter reading to settle. Note the reading.
14. With the LISTEN button still pressed, turn the selector switch to the BATTERY RB7 H. T. 1 position. Verify that the reading is steady and not less than 0. 435 times the reading referred to in para. 13. The graph shown in Fig. A. 3 may be used to avoid calculation. If the meter reading is not steady or does not reach the minimum acceptance figure, locate the faulty item by substituting another Beacon or Transistor Power Unit and Battery.
15. Continue with tests on page 6 headed:-
"B. SARAH HT. 2. CURRENT CONSUMPTION".

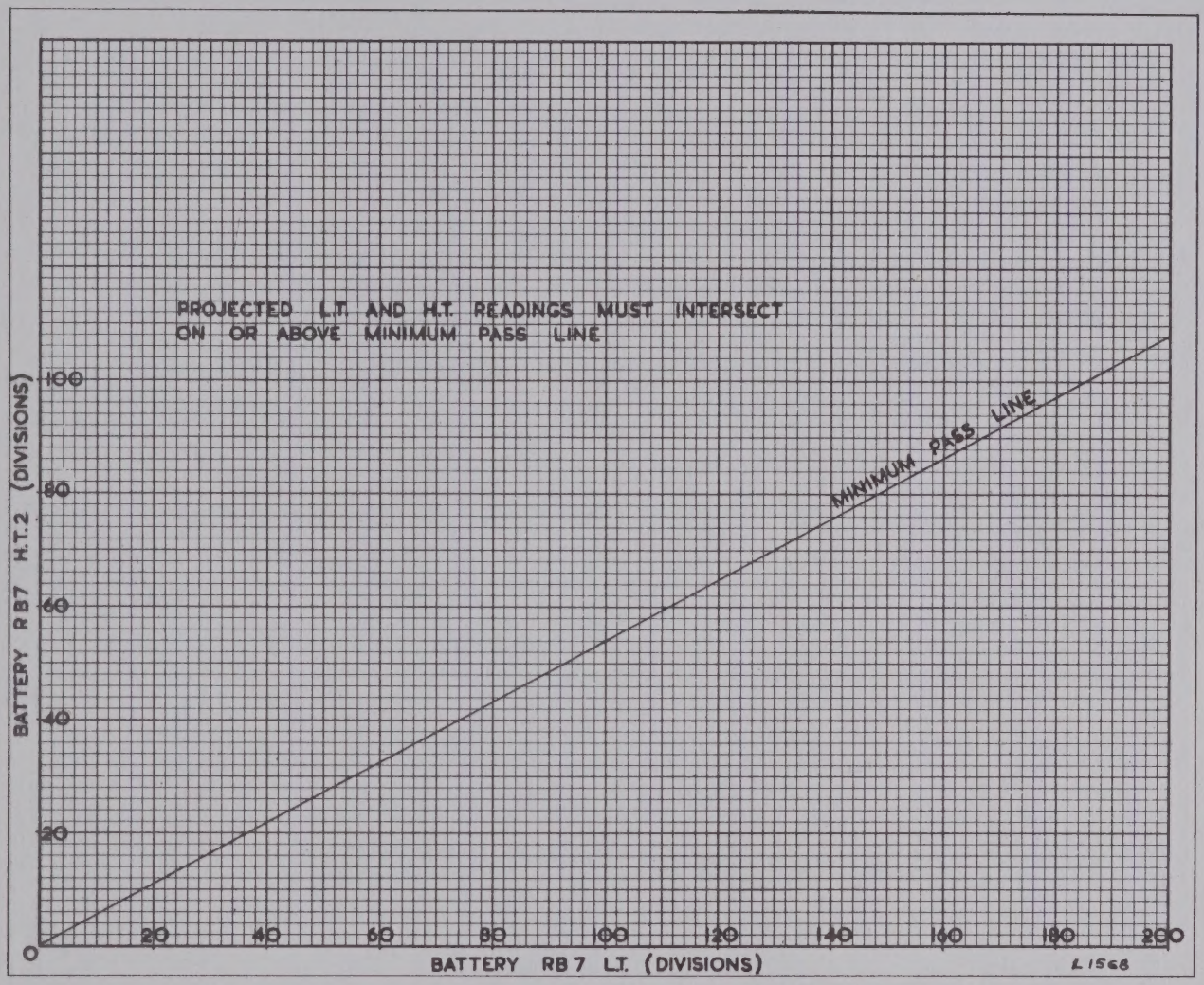


FIG. A.2 H.T.2/L.T. RATIO GRAPH

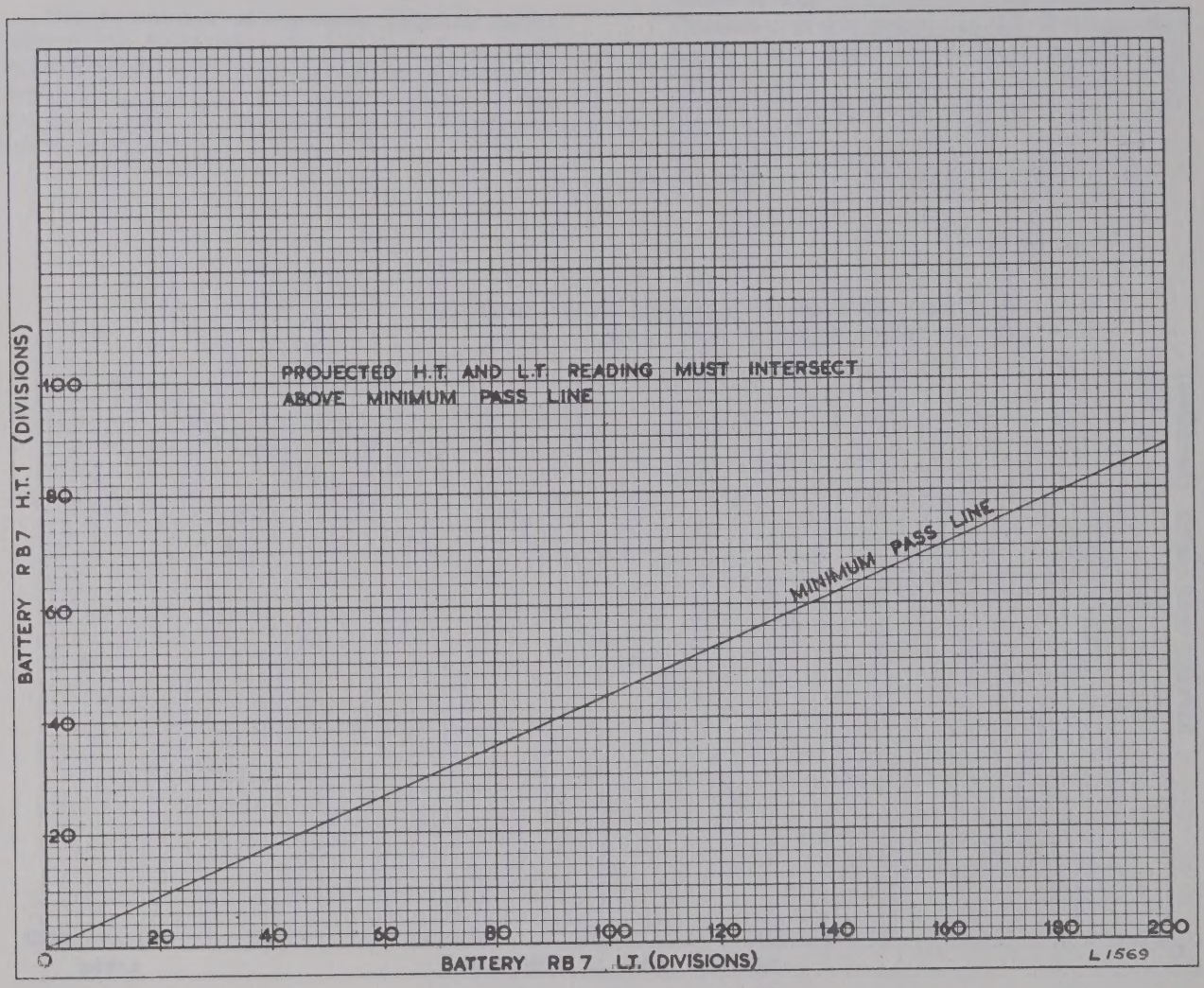


FIG. A.3 H.T.1 / L.T. RATIO GRAPH